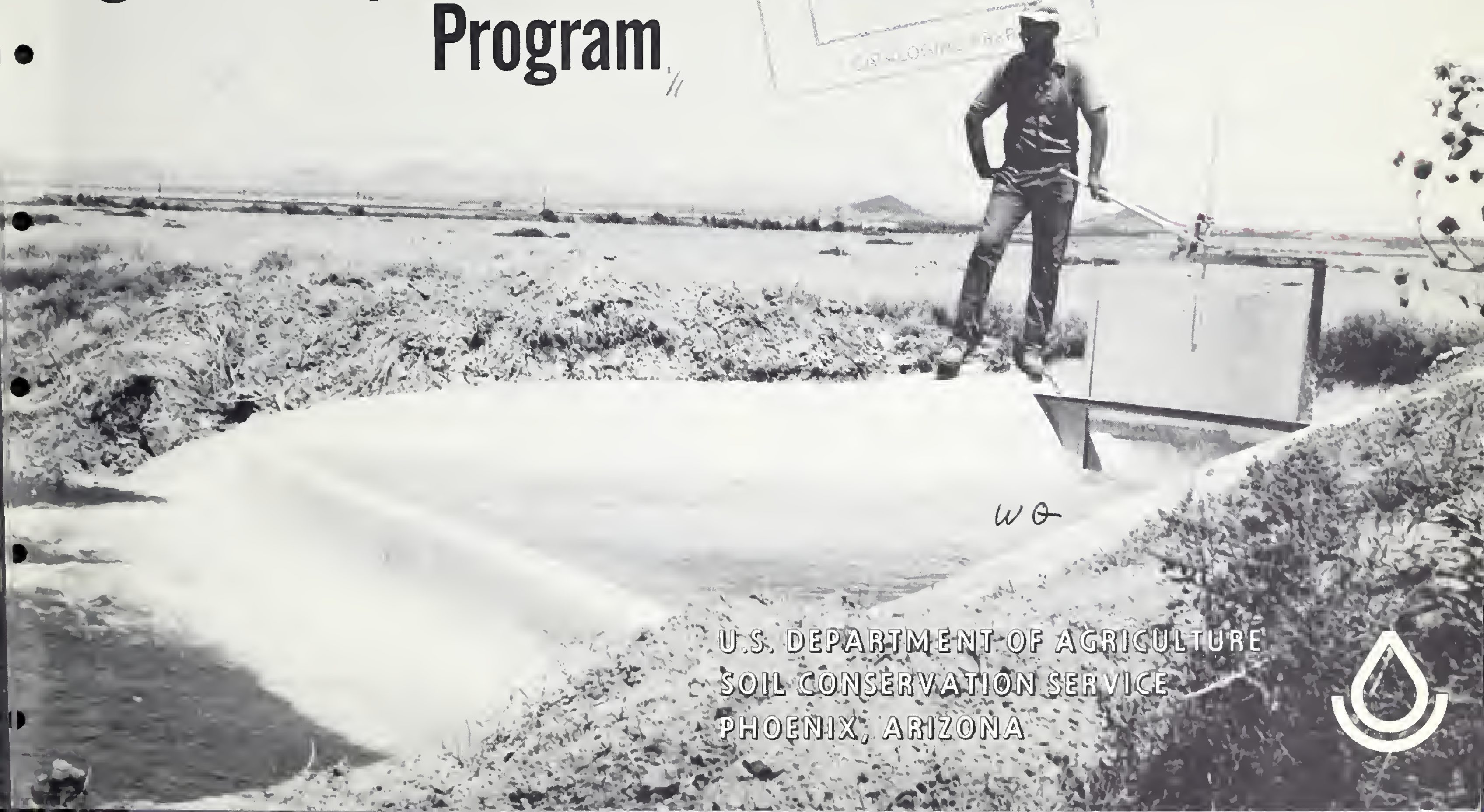
WELLTON-MOHAWK Irrigation Improvement Program



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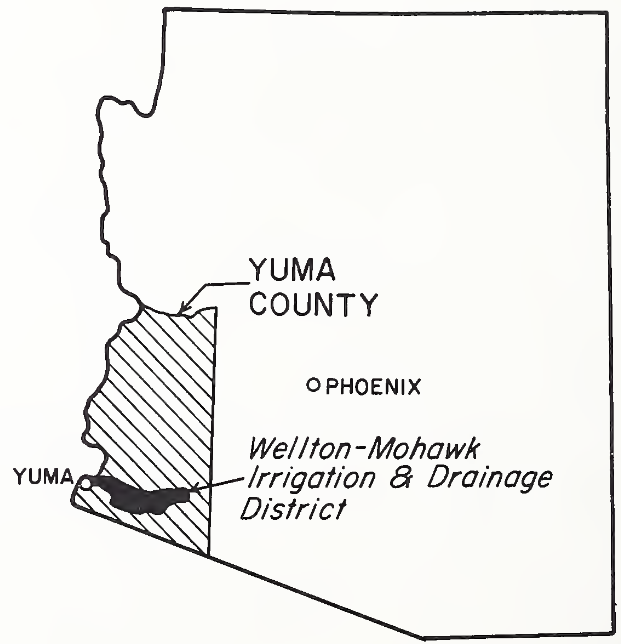
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
PHOENIX, ARIZONA

WELLTON – MOHAWK IRRIGATION AND DRAINAGE DISTRICT

The Wellton-Mohawk Irrigation and Drainage District headquarters is at Wellton, 30 miles east of Yuma and 150 miles southwest of Phoenix. The District extends for 46 miles along the Gila River. The Mohawk Mountains on the east and the Gila Mountains on the west provide distinctive landmarks of these boundaries.

The soils of the area are deep, water-deposited sediments. In the valley, which is the majority of the area, soil textures vary from clays to sands. They are well to poorly drained and have a varying degree of salinity.

On the mesa, a narrow strip along the south boundary of the District, the soils are well-drained sands. Soil and water management in this area requires more care and intensity to prevent misuse.



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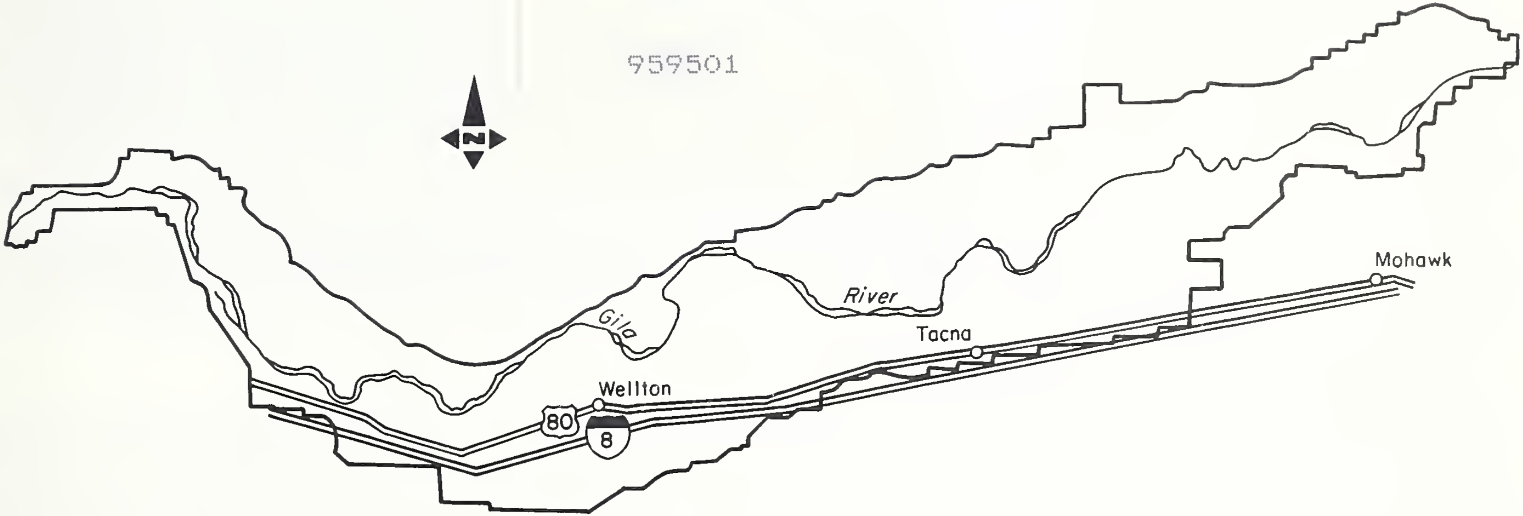

The Wellton-Mohawk Irrigation Improvement Program's goal is to reduce return flows from the Wellton-Mohawk Irrigation and Drainage District. The program is administered by personnel of the Special Project Office located in Wellton.

The area around Wellton has been an oasis for travelers and farmers. Its lifeblood was the waters of the Gila River. Although intermittent and unpredictable, this water served as the foundation upon which the Wellton-Mohawk area has developed.

Pima Indians are believed to have irrigated some of the bottomlands in this area as early as 1538. Father Kino and de Anza followed the Gila River in the 17th and 18th centuries looking for a safe route to California. Wellton was the end of the Camino del Diablo, the Devil's Highway, for those fortunate enough to survive this southernmost route to California. But, drought, heat and Indians discouraged settlement of the area until the 1850's.

In 1857 the establishment of the Butterfield Stage Line between San Diego and San Antonio marked the beginning of white settlement in the area. Growth was slow but by 1875 a number of homestead filings had been made. Then, in 1878, the Southern Pacific Railroad was constructed and service at Wellton was begun in February 1879. Attention was now focused more fully on developing the water in the Gila River.

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Looking west from hill on McElhaney Farm, the irrigated fields extend beyond our sight.

EARLY DEVELOPMENT Between 1880 and 1915 the industrious homesteaders developed several thousand acres of farmland stretching for 40 miles along the river. They constructed the Mohawk and Antelope canals and diverted the Gila to provide irrigation water. Because of the erratic and silt-laden flows attention was turned to pumping of groundwater in 1915. This was successful and for 15 years the area continued to grow and flourish.

By the 1930's building of dams on the Gila River above the Wellton area and the heavy pumping of groundwater caused a severe lowering of the watertable. As a result, the groundwater became increasingly saline. Through the concentrating effect of consumptive use, soil salinity increased rapidly. In 1941 heavy runoff recharged the watertable but provided only a temporary relief to the farmers' problems. Agricultural activities began to decline and crops that could be grown were limited.

COLORADO RIVER WATER The solution proposed was to import Colorado River water. This became a reality in 1952 as part of the Yuma Area Projects constructed by the Bureau of Reclamation. The Wellton-Mohawk Irrigation and Drainage District was formed in 1951 to manage and repay the monies used to construct the system. By 1957 a complete delivery system was in operation.

The watertable was now recharged very rapidly. As early as 1957 crop yields in part of the valley were decreased because of the high watertable. It became necessary to remove the excess groundwater by pumping.

This drainage, which was very saline, was discharged into the Gila River and flowed into the Colorado River. It was diverted at Morelos Dam for irrigating extensive farmland in Mexico. As flows in the Colorado decreased, because of heavy demand upstream, the salinity of the water arriving in Mexico increased dramatically. This created an international problem.

The Presidents of the United States and Mexico met in March 1962. They created the International Boundary and Water Commission to plan and administer solutions to this situation.

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Feedlot on the mesa overlooks pastoral valley to the north.

SALINITY CONTROL Between 1963 and 1973 a series of measures were installed to alleviate the problem. These included the control of flows in the Colorado River to adjust the quality of water. Also, the main outlet drain extension was built to discharge part of the Wellton-Mohawk return flows below Morelos Dam. As much as 50,000 acre-feet of water per year was released down the Colorado into the Gulf of Mexico.

In the water short Southwest, this was not considered a final or satisfactory solution. In August 1973, Minute No. 242 was signed by the Commission. In it the United States agreed to furnish Mexico the annual allotment of water agreed to in 1941 at a controlled salinity level. That water quality is to be no more than 115 parts per million plus or minus 30 parts per million over the quality of water diverted at Imperial Dam.

In order to implement this agreement Public Law 93-320 "Colorado River Basin Salinity Control Act" was passed by the Congress of the United States and signed into law in June 1974.

TITLE I Title I of this Act authorizes programs in the Basin below Imperial Dam to control salinity of water delivered to users both in the United States and Mexico. The major feature is a desalinization plant to treat the return flows from the Wellton-Mohawk District. It is scheduled for completion in 1981.

To reduce the cost of this plant other programs were planned which would reduce the volume of the return flows. These programs provide for a multi-agency approach of on-farm water management and improvement assistance to be offered to farmers in the Wellton-Mohawk District. Agencies involved and their programs include: Bureau of Reclamation—Irrigation management service program and Acreage reduction; Agricultural Research Service—Research and demonstrations; Cooperative Extension Service—Education and information; Soil Conservation Service—On-farm irrigation improvement program.

The Soil Conservation Service established and staffed the Wellton-Mohawk Special Project Office in February 1975. The other agencies were also preparing for their responsibilities.

Fred Tregaskes, Soil Conservationist, reviews plan with cooperators, Jerry and Sondra Lindsey

ON-FARM IRRIGATION IMPROVEMENT Total acreage in the Wellton-Mohawk Irrigation and Drainage District is 75,000 acres of which 71,000 acres have been irrigated. Between 1970 and 1972 the average efficiency of water use for the district was 56 percent. To accomplish the goal of reducing return flows by 78,000 acre-feet per year, it is estimated that the average efficiency of water use will need to be raised to 72 percent.

The Soil Conservation Service's role is to assist farmers in improving their irrigation systems on approximately 23,800 acres. When applied each system will have a potential irrigation efficiency of greater than 65 percent. Highest priority for receiving assistance will be given to those farms which have the lowest efficiency according to the Irrigation District's records.

When a farmer's application for assistance is selected, he and a Service technician will develop a conservation plan and contract for cost-sharing. The federal cost-share for installing eligible practices is 75 percent of the average cost for installing that practice within the area. A list of eligible practices is maintained at the project office and the average cost is checked and modified each year.

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Planner maps existing irrigation system near Mohawk Mountains.

Bill Johnson, Soil Scientist, surveys the farm's soils.

RESOURCE INVENTORIES The first step in developing a conservation plan is to make a detailed soil survey of the farm. The staff soil scientist uses aerial photographs and either a hand auger or truck-mounted, power auger to accomplish this job. During his systematic mapping of the farm, he notes all soil types and any variations. The information is recorded on the photograph. At the office the map is inked to provide a permanent copy of the data.

The soil scientist then prepares a detailed description of each soil. Using this data, interpretations are made for each soil relating its potentials and limitations to the planning and design of an efficient irrigation system.

The soil conservationist and engineer are now ready to complete the farm's resource survey. The condition and size of the existing irrigation system is recorded. Lengths of run and slopes are surveyed and mapped. The farmer and conservationist discuss cropping history and decide upon the crops to be grown during the life of the contract.

Using this inventory data the conservationist develops alternative treatments which will accomplish the goal of high level irrigation water management. The alternatives are all based on a water delivery rate of 15 cubic feet per second.

The conservationist now reviews the data with the farmer. Then, when the farmer has decided on the treatment to be applied, they develop a conservation plan of operations for the farm. The practices to be applied to achieve the desired results are recorded along with the location and date when the work will be done. A contract is then prepared and signed obligating the farmer and the federal government to carry out the plan.

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IRRIGATION SYSTEMS—FLOOD Most of the irrigated acreage in the Wellton-Mohawk Irrigation District was being flood irrigated when this program began. It is proposed to improve the flood systems on approximately 19,800 acres. The improved irrigation systems are to result in minimum efficiencies of 64% on the mesa, where soils are sandy, and 74% in the valley.

Practices have been identified which may be needed to reach this goal. One, all or some combination of these practices will be used on each field to obtain the selected degree of irrigation efficiency. The following items include the primary practices being used to improve flood systems.

1. Ditches—All ditches will be concrete lined and will be large enough to carry a 15 to 28 cubic feet per second head. As necessary, old ditches that are too small or deteriorated to function properly will be removed. Ditches may also be relocated to reduce the length of run. Ports or field turnouts are installed on every ditch.

   As part of the ditch improvement, a critical depth flume will be installed near the farm's District turnout. This flume permits easy measurement of the irrigation flow. It is an important part of the evaluation and management of the irrigation system.

Critical depth flume installed in farm ditch.

Field turnout structure spreads water onto field.

Laser controlled equipment finishes the land leveling job.

2. Leveling—This is a key practice. Fields must be leveled to a close tolerance to achieve good water management. One method which has aided this practice is the laser controlled equipment used in finishing a leveling job.

In designing the leveling job for a farm an important consideration is the size of the fields. In the Wellton-Mohawk Project, all fields are sized according to the soil characteristics and delivery of the 15 cfs head. This includes both the length and width of the run.

Another practice which may be used with leveling is mechanical soil improvement. It involves the removal of small areas of soil with poor water management properties. The excavation is then filled with a soil with water management properties similar to those in the rest of the field.

The completion of the leveling may not end the job of land preparation. In some cases the past use may have created plowpans which restrict root development and water movement. Therefore, chiseling or subsoiling have been included as cost-share items in the program.

The Soil Conservation Service personnel at the Project Office provide assistance in designing, field layout and checkout of these practices. To qualify for cost-sharing the work must meet the standards and specifications developed for the practice.

Side roll system irrigates an alfalfa field.

Drip emitter provides water to mature citrus tree.

Pressure regulator and control valve installed in a drip system.

IRRIGATION SYSTEM—PRESSURE It is proposed to convert approximately 4,000 acres to pressure systems as part of the Wellton-Mohawk Irrigation Improvement Program. Most of this acreage will be in existing citrus orchards on the mesa. Here the soil is generally sandy and the flood systems being used are less efficient than systems in the valley. With these conversions a minimum of 80% efficiency is the goal.

Systems may be designed by an irrigation company. However, the SCS reviews and approves the final design to assure that it will meet the criteria and specifications required.

Two types of systems, sprinkler and drip, qualify for the program. Within each of these systems there are a variety of choices. These include:

1. Sprinklers—A farmer may select a side roll, center-pivot or solid set (permanent underground) system.
2. Drip—These are separated into two general categories:
   A. drip, which refers to very low volume, flow emitters ranging from 1 to 4 gallons per hour, and
   B. bubbler, which have a much higher volume of flow ranging from 30 to 60 gallons per hour.

In order to make use of these systems additional improvements are generally required. These may include storage reservoirs, pumping plants and filtration devices. As part of the system these items are also cost-shared.

SOIL AND CROP MANAGEMENT The design and installation of the irrigation system is an important first step toward achieving the goal of better water use. The construction of the system means only that there is the potential for water savings. Soil, water and crops must be properly managed to achieve the designed efficiency.

The management practices needed for a farm are included in the conservation plan of operation. These practices must be applied as part of the contract. The Soil Conservation Service provides technical assistance to farmers in the application of the selected practices.

The soils of the farm and the crops to be grown are the primary factors that determine management practices to be applied. During the planning process, the farmer and conservationist discuss the soil properties. Then, in the early phases of planning, they determine what crop or crops will be grown during the life of the contract. Where more than one crop is selected, a crop rotation that will maintain soil tilth and fertility is planned.

Minimum tillage and crop residue management are also important practices included in the plan. All crop residues are plowed under to increase soil organic matter. The minimum tillage to produce a crop is planned and performed at proper moisture levels to prevent soil compaction.

Leveled field just below the mesa produces a uniform crop of wheat.

Farmer plows down crop residues

Water stands in furrows across this leveled field of melons.

Tensiometers provide soil moisture data in this citrus orchard.

IRRIGATION WATER MANAGEMENT Water management is the most important practice in reducing return flows. The crop being grown and the stage of growth influence the amount of water needed at each irrigation and the time between irrigations. Leaching irrigations may also need to be applied periodically to move salts down through the soil profile. These considerations are included in a water management plan for each contract.

The Bureau of Reclamation is also providing assistance in this area through the irrigation management service program. They are using neutron probes to measure the soil moisture as a guide in determining when irrigation is needed. Measuring stations are established in each field and read at scheduled times. The Agricultural Research Service is working with tensiometers in their drip systems to accomplish the same purpose.

With the knowledge of water flow rates, system efficiency and crop needs, the farmer will be able to determine the amount of water to be applied and its timing. This proper application will reduce deep percolation thus reducing the volume of return flows.

All programs and services of the U.S. Department of Agriculture are available to everyone without regard to race, creed, color, sex, or national origin.

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